

Looking for Very Short-Period Planets with the K2 Mission

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Recent discoveries of nearly one hundred Earth-size and smaller exoplanets and candidates with orbital periods less than 1 day pose the severest challenges yet to theories of planetary origins, but understanding their origins may elucidate key processes in formation and evolution. Given their short orbital periods, building the requisite signal-to-noise to detect the candidates by stacking multiple transits requires a much shorter observational baseline than for longer-period planets, and the transits are likely more robust than those of longer-period planets. Likewise, ground-based follow-up to study the host stars spectrally and estimate the planets' masses via radial-velocity measurements require only modest resources. In this proposal, we briefly describe our plans for using K2 photometry to find more very short-period planets orbiting Sun-like stars and to follow them up with ground-based spectral observations. We request data for 999 targets, split between campaigns 4 and 5, making this a "small" proposal, and we will focus especially on involving students in the research. Given the estimated frequencies of very short-period planets, we expect to find between 5 and 10 such objects -- a small enough number that a dedicated ground-based follow-up program is imminently feasible but still scientifically compelling.